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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex Parte* JOSEPH W. HARRIS

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Appeal 2009-011888
Application 10/628,651
Technology Center 1700

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Oral Hearing Held: May 4, 2010

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Before BRADLEY R. GARRIS, CHARLES F. WARREN, and MARK NAGUMO, *Administrative Patent Judges.*

APPEARANCES:

ON BEHALF OF THE APPELLANT:

KRISTI L. DAVIDSON, ESQUIRE
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The above-entitled matter came on for hearing Wednesday, May 4, 2010 commencing 9:30 a.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Timothy J. Atkinson, Jr., a Notary Public.

THE USHER: Calendar No. 2 Appeal No. 2009-011888, Ms. Davidson.

JUDGE GARRIS: Thank you. Good morning, Ms. Davidson.

MS. DAVIDSON: Good morning.

JUDGE GARRIS: If you have a business card, would you please give it to our reporter.

MS. DAVIDSON: Just one?

JUDGE GARRIS: Yes, please, just one would be fine. I suppose that the material in these handouts is of record in your Briefs?

MS. DAVIDSON: Absolutely.

JUDGE GARRIS: Might you have an extra copy for the court reporter? If you are going to refer to them a lot, it may help.

MS. DAVIDSON: I don't.

JUDGE GARRIS: That's all right, we'll take care of it.

MS. DAVIDSON: I'd have to give him mine and then I'd be lost.

JUDGE GARRIS: We don't want that. Okay, as you know, I'm sure, you have about 20 minutes to present your case, please begin.

MS. DAVIDSON: Thank you. I'm Kristi Davidson, counsel for the Appellant. I appreciate your time this morning. Claims on appeal in the present case include four independent claims, each of varying scope, some are more narrow in some respects and broader in other respects than other

independent claims. In addition, there are several dependent claims adding further limitations. For instance, Claims 5 and 36 add temperature limitations regarding solidus and liquidus, Claims 7 and 38 add major thermal arrest, and Claims 43 and 44 further limit Claims 1 and 22 by the proviso limitations that's been talked about quite a bit in the prosecution history regarding the combined tin and the antimony content which proviso is already present in independent Claims 35 and 39.

The evidence here includes 40 test alloys, some of which were subjected to multiple tests, and so there's a significant amount of evidence to base -- the presentation that I've prepared for you attempts to organize the issues and the claims and the evidence in a manner that is hopefully easier to digest than sort of a piecemeal presentation for our prosecution. In addition, the presentation contains the evidence in color which I had hoped to get before the Board by other means, but I'm not sure the Patent Office permits that.

JUDGE GARRIS: We have the original Affidavits that you submitted.

MS. DAVIDSON: Okay, they didn't convert them to black and white?

JUDGE GARRIS: Well, they do in the file, but they -- if you look at our eDAN you will see things like artifacts. We ordered those and that has in the folder the original color materials.

MS. DAVIDSON: Okay, good. And what I've done in the presentation is I've annotated them a little bit. I've also included the page number where you will find the corresponding photograph in the Appeal

Brief. Just to let you know, it is already in evidence, but I've added annotations about things that we talked about through prosecution such as here is an example of where it has poor flow or here's where it failed to cap, and things such as that.

There are several points that I want to stress today, first being that there are certain limitations in certain claims that I believe have been demonstrated by the evidence to not necessarily be present in the prior art. There has been the rejection that certain limitations are inherent, for example, the temperature limitations. And, for example, Claim 5 specifies a liquidus below 1410. Ten out of the 40 test alloys have a temperature greater than 1410 for the liquidus, only one of which is within the scope of Claim 1. So we believe that proves that it's not necessarily a feature that is present in the prior art, specifically, Polish Abstract.

I also want to point out that there is synergy present in the claimed alloys as there really is in any alloy composition. And there is a multi-factor balancing need for braising alloys. So, we're not simply concerned with one factor, we're trying to balance multiple things in order to produce a suitable solid brazing component.

JUDGE GARRIS: Counsel, what evidence do you have that the synergy that you apparently refer to is different parts, you know, different amounts of phosphorus with respect to different amounts of nickel and so forth? What evidence of synergy do you have in the record?

MS. DAVIDSON: The 40 test alloys show that as you vary one thing, you have this effect on temperature or you have this effect regarding extrudability or --

JUDGE GARRIS: But why is that any different for your claims as it is for the prior art generic recitations?

MS. DAVIDSON: The prior art alloys have synergy. My point being that an attempt to view the evidence with respect to a single element or a single factor, it does not give you an accurate picture with respect to the prior art or with respect to the claims because alloys almost by definition are synergistic materials, unlike just normal chemical situations where synergy is not necessarily a factor.

JUDGE WARREN: How does the synergy as you would say characterizes the claimed subject matter? Distinguish over that in the prior art.

MS. DAVIDSON: Well, we have defined narrow ranges in which that synergy comes together to produce certain factors that produce a viable brazing alloy. The prior art contains very broad ranges. When you operate in certain areas of those ranges, you don't get the factors that we're trying to achieve, such as the ability for form it into a solid brazing component. You may also get temperature profile consequences that we're trying to avoid.

JUDGE WARREN: I understand some of the Examiner's arguments to be though that a good number, perhaps many, of the alloys within the scope of the present claims appear to be not too -- better than alloys in the prior art.

MS. DAVIDSON: I think -- and that's where I get into this multi-balancing factor issue. He'll say that it's not better because the, the alloy of the prior art shows a good temperature profile. Well, it may have a good

temperature profile, but it hot shorts when you try to extrude it or it won't flow into the joint.

JUDGE WARREN: And you're -- all the alloys within your Claim 1 will do that?

MS. DAVIDSON: Not necessarily. The -- there's one alloy that's been much talked about -- a couple alloys that have been much talked about. Alloys I and J, for example, were tested at the end points of the tin and phosphorus ranges, and what we've taught is that if you increase one, you may have to do something to the other to balance that out. And so when you have both of them at the opposite end points, you have a negative effect. And the evidence talks about one skilled in the art with the specification in front of them would know how to treat that to get it to have the factors that we want it to have.

JUDGE WARREN: Not necessarily, would they? I mean you're not, you're not -- your claim doesn't necessarily lead one skilled in the art to -- or one of ordinary skill in the art to any particular outstanding alloy such as your alloy K that you were talking about as being quite exemplary. In other words, the prior art has end points just as you do. They also have a combination of elements that they say within these ranges, this element will interact with these other elements to form an alloy. So really, if you look at Claim 1, the only factor that you have is it has to be above a particular -- has to have -- what is it, the liquidus temperature --

MS. DAVIDSON: 840 degrees Fahrenheit --

JUDGE WARREN: A liquidus temperature above 840 degrees Fahrenheit, that's quite a broad range.

MS. DAVIDSON: Well, the 840 degrees was put into the Claim because that is the bright line in the art that distinguishes a brazing alloy from a solder alloy. So that is by definition what it means to be a brazing alloy, you have to have a liquidus above that temperature.

JUDGE WARREN: So you're saying that every other alloy within your Claim 1 that has liquidus temperature above that point which is known in the art and which, of course, would be known by even one of ordinary skill in the art, would function as a, as a brazing compound?

MS. DAVIDSON: No, it would not automatically function as a brazing compound. It may qualify as a brazing alloy within that definition, but there are other aspects that are required for it to be suitable as a brazing alloy. For example, the definition of brazing, which is on page 3 of your presentation, requires that the filler metal be distributed between two or more close-fitting parts by capillary action. So --

JUDGE WARREN: Is that in your Specification? Is that definition in your Specification?

MS. DAVIDSON: No, but it is inherent in the term brazing, that is the definition of brazing. It's that -- and it's what distinguishes brazing from welding, for example.

JUDGE WARREN: So that's known in the art?

MS. DAVIDSON: Oh, yes, absolutely.

JUDGE WARREN: So one of ordinary skill in the art with that knowledge could go into the reference and, and select alloys from the -- of the reference?

MS. DAVIDSON: Not without undue experimentation. I mean we've done --

JUDGE WARREN: Well, then how do they go within your Claim without undue experimentation?

MS. DAVIDSON: We've narrowed the ranges to the point where it's actually more -- much more likely to achieve a suitable brazing alloy. For example, the Polish Abstract has .1 phosphorus, it, it won't flow. They teach a carrier that doesn't act as a fluxing agent. Fluxing is absolutely necessary to lower the surface tension at the surface of the parts to allow the capillary flow to occur. There are cohesives forces at the surface of the parts that hold that allow and make it form into globs, and you'll see that in some of the photographs where we said it didn't melt and flow. It's because the surface tension was so high by failure to flux the surface that it was not able to have that capillary action that is by definition an inherent element of a braze.

JUDGE WARREN: So, Alloy F which falls within your Claim 1 is, is not a good alloy according to the Examiner?

MS. DAVIDSON: It is within the scope of Claim 1, but the purpose of Alloy F was really to show the effect of the proviso limitation, that, that alloy is outside the scope of independent Claims 35 and 39. While every other limitation is within the broad -- the narrow ranges we've specified in Claim 1, it, in fact, is outside the combined tin and antimony content which has a negative effect as we've taught in the Specification.

JUDGE WARREN: So then your declaration evidence just with respect to the PO reference only refers to examples -- to Claims 35 and 39?

MS. DAVIDSON: I'm sorry, repeat?

JUDGE WARREN: Well, you mentioned Claim 35 and 39, you have three examples in the first declaration that fall within Claims 35 and 39. They have three elements in there that are -- they consist of three elements. So those elements, clearly nickel, for example, which is required by Claim 1 doesn't fit Alloys I through K. Alloy F fits Claim 1.

MS. DAVIDSON: Correct.

JUDGE WARREN: So you're saying that, again, this Alloy F fall within your claim and why wouldn't one of ordinary skill in the art consider it useful?

MS. DAVIDSON: It would not -- it had a problem with forming into the solid brazing components because, as we taught in the specification, when you exceed 10 percent in the combination of tin and antimony, it has a negative effect with the ability to form into a solid component, and the ductility of the alloy which affects whether it will crack in service. So --

JUDGE WARREN: But that limitation is not in Claim 1?

MS. DAVIDSON: No, it was added in dependent Claim 43 which is still rejected.

JUDGE WARREN: Okay.

MS. DAVIDSON: So Claim F was really trying to show yes, there are some alloys within our range that may not function, but we taught you why not. And, you know, if, if the proviso limitation is a necessary limitation, I'm happy to amend Claim 1 to include it, that's why I put Claim 43 in there, but Claim 43 remains rejected. And I can't find any evidence in the prior art that they recognize the issue with the combination of tin and

antimony exceeding 10 percent, and so, I'm not sure why that continues to be rejected.

In addition, Table A sort of gives a nice picture of -- it highlights in yellow which, which test alloys are within the scope of which claims. And highlighted in pink are the alloys that exceed the temperature limitation in Claim 5 and also exceeds the limitation in Claim 37. And highlighted are also the elements which are believed to contribute to that high liquidus temperature.

JUDGE WARREN: Counselor, can you point out for us where the Table A in the third Henson Declaration is explained in the declarations?

MS. DAVIDSON: Table A, I know, is provided in the Appeal Brief. It's the -- that was submitted in the second declaration. Yeah, we submitted it in our -- I'm sorry, where --

JUDGE WARREN: It's at page 176 of your Brief.

MS. DAVIDSON: And what was your question about it?

JUDGE WARREN: Where is it explained in the Affidavits?

MS. DAVIDSON: It's explained throughout the Affidavits. I mean he goes through alloy by alloy.

JUDGE WARREN: But in the Affidavits, they talk about the alloys that are present on pages 1 and 2 of the first Henson Declaration.

MS. DAVIDSON: The third Declaration doesn't really submit anything --

JUDGE WARREN: The third Declaration is the only one that we found that has a table labeled Table A --

MS. DAVIDSON: Which means --

JUDGE WARREN: -- and includes Alloys A through K on the first page, Alloys 4-a through 4-b on the second page, and Alloys 5-b through 17-b on the third page.

MS. DAVIDSON: Table A is a combination of the evidence that was submitted in the second Affidavit --

JUDGE WARREN: But this is all the liquidus --

MS. DAVIDSON: -- and the Application.

JUDGE WARREN: Oh, this is the liquidus, solidus, and MTA temperatures for all these other alloys that appear nowhere else in the Affidavits except in this Table A.

MS. DAVIDSON: Oh, they appear in the Applications, the --

JUDGE WARREN: But they don't appear in the Affidavits. So I'm, I'm just -- I'm asking again if, if Table A that's attached to the third Henson Affidavit is explained in an affidavit?

MS. DAVIDSON: I don't know that the table is part of the Affidavit or part of my submission with the Affidavit. It was an attempt to combine all 40 alloys that have been presented, whether by -- through the second Affidavit or through the present Application or its parent.

JUDGE WARREN: Okay.

MS. DAVIDSON: So I combined what he was talking about with respect to A through K with what we had already submitted in the Applications. So I created Table A for the Examiner's convenience.

JUDGE WARREN: Okay.

MS. DAVIDSON: Also in the presentation that I've given you on page 3 is the balancing of factors that I was speaking of before, the various

things that we're concerned about in a suitable brazing alloy. Ductility comes into play both in forming the alloy as well as its ability to withstand the normal stresses that occur in use of the parts that are joined. We're concerned with the temperature profile. When you're forming a braze, you're not actually directly heating the filler metal. What you do is you heat up the metal parts and that heat is conducted through the metal part, and then as you're touching -- contacting the part with, with the filler metal, the part heats up the filler metal and when it reaches its brazing temperature it melts and flows into the capillary. So the reason that the temperature profile is of concern is that the longer you're heating your metal parts and the higher you're heating them at, the more annealing you're going to do with the metal parts and annealing softens the parts thereby making those parts more prone to failure. So if we can get the brazing temperature towards the lower end of the temperature range and make it very narrow, that avoids undue damage to the part through the annealing process.

JUDGE WARREN: And you explained this in your Brief?

MS. DAVIDSON: I believe that the importance of the temperature profile has been discussed throughout. I'm not sure if I explained just how the brazing is done there in the Brief, that would be known to one skilled in the art how brazing is performed. That's really a little bit of background information of why the temperature profile is important which has been discussed at length.

JUDGE NAGUMO: Could you discuss a little bit the meaning of the phrase consisting essentially of that's used in the claim? It seems I couldn't get a grip on exactly how this is supposed to limit the claim.

MS. DAVIDSON: Because alloys are so synergistic, I mean just about anything you try to add into here is going to have some effect on one of these factors. So in order to make sure that we have a viable braze, we do need to limit the universe to just these components which we know how they interact. So if you add zinc or some other component in there, it's going to affect one or more of ductility or the ability to flow, the ability to cap. It may cause black oxide formation which obscures the ability to visually inspect it. It may affect the temperature profile. So we are limiting an intentional addition of any other alloying elements into it. Claim 39 we add consist of, and not just on the alloy but solid brazing component itself must consist of, which precludes this methyl-cellulose-glucose vehicle that was used in the Polish Abstract which had disastrous results for us, and certainly you would not want to have present when trying to form it into a solid brazing component.

JUDGE NAGUMO: Well, the classical definition of consisting essentially of would have the comprising except for a component that changed the basic -- so are we to look at the five or several parameters that you have listed? For example, on page 3 of the presentation here and be given to understand that one of skill in the art would understand what other components that might be present would not affect these various properties adversely? It's a little difficult for me because of the range of the claim and there are certain alloys within the scope of the claim -- or within the apparent scope of the claim that, in fact, don't make a very good brazing alloy or maybe don't function as a suitable brazing alloy at all. So what I'm

trying to tease out of the scope of the claim is -- as I understand you to say consisting essentially of is very close to consisting.

MS. DAVIDSON: Yeah, it actually is in the case of alloys because, truly, just about anything you add in here is going to affect some basic material property of this alloy. So, yeah, it wouldn't be the world's worst thing if we had to use the words consist of because really, we do want to limit the universe to what we've set forth here in the claims.

With respect to the ranges, just -- if you just look at one component by itself, okay, phosphorus 4:9, 4:10, what happens when you start to get to the upper limit of phosphorus, 8.4 percent is the eutectic point of phosphorus. Up to that eutectic point, phosphorus lowers the liquidus temperature. Once you exceed the eutectic point, it begins to make it rise. Now, you can counteract that with certain other elements such as tin. So you could add a higher amount of tin into it which will sort of counteract that higher amount, but when you add too much tin in, well, now you've destroyed the ability to form it into a solid brazing component. So one skilled in the art with the information in front of them knows, okay, if I'm approaching that upper limit of phosphorus above the eutectic point, I've got to do something else to counteract that. And if they pick 1 percent tin, that's not counteracting it.

So, yes, there are possible bad choices within the claims, but that doesn't mean that there's rampant inoperability in the ranges that we've provided. One skilled in the art with the specification in front of them I believe has the information they need to make the right choices.

JUDGE GARRIS: We're about out of time. We've actually gone beyond the 20 minutes.

MS. DAVIDSON: I thought so.

JUDGE GARRIS: Recognizing this is a complicated case, we've asked a lot of questions.

MS. DAVIDSON: It is.

JUDGE GARRIS: So let me just ask you this as a way maybe to lead towards an end of this hearing. We understand from this record the claims include alloy compositions which do not function very well by your own admission. Likewise, the prior art that's been applied discloses broad ranges that include alloys which also do not perform very well. But that is not really the issue that we need to focus on in my view, what we want to focus on is what would have been obvious in light of these prior art disclosures to one with skill in this art. And so my question is if the references seek to have a brazing alloy just as defined by your claims, why would not the specific compositions defined by your claims, why would those not have been obvious to a skilled artisan in attempting to optimize the ranges that are broadly disclosed in the references and, thereby, obtaining a brazing alloy that is -- functions in at least a workable and perhaps optimal way? Is there something, in other words, that is unexpected by your claimed alloys or something unexpected shown in your Affidavits for your claimed alloys that would not have been the result of optimizing the prior art compositions?

MS. DAVIDSON: What is not obvious in view of the art is that the narrowing of the ranges and the interaction between the elements. The prior art does nothing to teach you where you're going to start to get in trouble within their very broad ranges. I mean 1-25 percent tin, a large portion of that range you're in trouble with forming solid brazing components as we've

claimed. So we've shown criticality for these more narrow ranges, and we've shown the interaction of the elements together, and that is unexpected in view of these incredibly broad ranges that appear, for example, in the Polish Abstract.

JUDGE GARRIS: Let me just ask you about that. As I said earlier, we understand that the broad ranges of the prior art include alloys that don't work or at least don't work very well. That has been shown in your Affidavit, but in that showing is something that a skilled artisan would not have been able to do, formulate the composition, test it, see if it develops cracks, see it doesn't flow properly, the capillary action is too inadequate to perform well as a brazing compound. All of these things it seems to me a skilled artisan would be capable of determining in seeking to optimize these broad ranges. What aspect of your claimed invention are, in fact, unexpected to one skilled in the art?

MS. DAVIDSON: I still believe that the Polish Abstract gives you no guidance whatsoever to get to an operable brazing alloy without undue experimentation. And that is, I think, the key, the universe that the Polish Abstract thinks is acceptable is huge. We've narrowed that universe down to a workable area in which some amount of experimentation may be necessary, but certainly not undue experimentation.

JUDGE GARRIS: How do you use the word undue experimentation in relation to what would have been obvious to one skilled in the art? It's unclear to me what you're saying here. Are you saying that the Polish Abstract, for example, is not enabled?

MS. DAVIDSON: Absolutely, absolutely. I've taken -- we have taken the one example provided in the Abstract and attempted to form viable brazes with it and it was disastrous.

JUDGE GARRIS: So you're really saying it's not -- what, not prior art to --

MS. DAVIDSON: I'm saying if it's prior art for all it teaches, it doesn't teach much of anything. You cannot use the alloy that they've said works, it doesn't.

JUDGE WARREN: And why does that one alloy control all with respect to the whole recitation?

MS. DAVIDSON: They've given you no other guidance --

JUDGE WARREN: On what basis, and on what basis you say it doesn't work? Just the attempts that you've made to, to have it perform?

MS. DAVIDSON: We made four different attempts to try and get that alloy to perform. We combined it with the powder in the carrier as they taught, and we tried to make it braze, it didn't work. Bob Henson, as one skilled in the art, said okay, if I want to try and make this work, what would I do? Well, I would, I would substitute that vehicle, liquid vehicle, that they used with a commercial floss. He tried that, it didn't work. The Examiner said it would be obvious to simply eliminate the liquid carrier, so we did that. We took just the powder and we tried to braze that and it didn't work. And then we took it and we processed it the way that we process it, we cast it into a billet, we tried to extrude it into a wire, and that didn't work. So we tried everything that we could think of with the Polish Abstract's example, and we couldn't get it to work.

JUDGE WARREN: The Polish Abstract suggests that the case that's discussed there is especially suitable for brazing of electric motor terminals. Did you try it on electric motor terminals?

MS. DAVIDSON: We tried it on copper parts which -- their brazing is directed to copper. And we couldn't get it to, to flow under capillary action at -- below the temperatures that they said would protect their electric motor. No, we did not specifically use an electric motor, we used generic copper tubes and copper T-joints.

JUDGE GARRIS: Okay, counselor, I think we're probably done for the day. You've given us a lot of useful information. We thank you for that.

MS. DAVIDSON: Thank you for your time.

Whereupon, the proceedings, at 10:00 a.m., were concluded.